Teacher Information
Lightning

I. Objectives

A. Forming Concepts (Introductory) Objectives

1. Explain the causes of lightning.
2. Describe conditions most favorable for lightning formation.
3. Describe lightning damage.
4. Describe the safest place to be during a thunderstorm.
5. Explain how thunder is formed.

B. Interpreting Data Objectives

1. Draw the types of lightning based on written descriptions of them.
2. Determine the areas of the continental United States where lightning is most frequent.
3. Determine the time of the day most lightning strikes occur.
4. Describe the flash to bang rule.
5. Explain first aid for someone who has been struck by lightning.
6. Explain why a car is a fairly safe place during a thunderstorm.

C. Applying Principles Objectives

1. Apply the flash to bang rule to determine the distance of a lightning strike.
2. Given the length of a mile in feet, use the flash to bang interval of 5 seconds per mile to determine the speed of sound.
3. Given conversion factors, convert feet per second to meters per second.

II. Interdisciplinary Uses

A. Social Studies

1. Describe beographic regions most likely to be hit by lightning.
2. Explain the economic consequences of something being hit by lightning.

B. Math

1. Interpret graphical data
2. Calculate the speed of sound.
3. Calculate the distance from a lightning strike.

C. Language Arts

1. Create written and oral communications about lightning.
2. Develop a safety plan for school students during thunderstorms.

III. Science Standards Coordination

The Lightning activity has been designed to incorporate science standards as specified by the National Science Education Standards (NSES) and the National Science Teachers Association (NSTA) Scope, Sequence, and Coordination (SS&C) of Secondary School Science. Only the major topics are listed. For Further explanation of each standard see the complete documents:

NSES-National Academy Press, 2101 Constitution Ave, NW, Washington, DC 20481
NSTA - 1840 Wilson Blvd, Arlington, VA 22201-3000

NSES	SS&C
structure of earth systems	heat, light, electrical energy
earth in the solar system	conductivity
transfer of energy	sparks and lightning
understanding about science and tech	
science and technology in society	

IV. Advanced Preparation

A. Materials

1. One computer per three or four students
2. One copy of the student activity book for each student or group of students

B. Time required to complete the activity

1. The Get Info Section takes 20 to 30 minutes.
2. The Gather Data Section takes 30 to 40 minutes.
3. The Applying Principles section takes about 30 minutes.

C. Teacher Familiarity with Lightning Activity

Preview these materials thoroughly. As with all these activities, before using this activity in class, review the sites and work through the activity yourself to learn about lightning so you can answer questions or direct the students to the answers.

The activity is set up so the students are taken to the pages that contain information that will be used to answer questions regarding lightning. The sites contain either the answers or the information from which the students can infer the answers. At the end of the activity, there is a list of enrichment activities and related web sites.

D. Select questions for students to answer

It would be prudent for you to read the questions students will be expected to answer. These questions are in order of ascending difficulty. Depending on grade level and ability level, you might want to assign specific questions for your students.

E. Student Grouping

These activities can be done individually or in small groups of up to four students. They can also be done at home for extra credit by students who are on-line at home.

F. Software Requirements and Duplication Preparation

1. Download Adobe Acrobat viewer for your platform (Mac or PC).
2. Download this instructor manual and the student activity book pages from the USA Lightning introductory page.
3. Duplicate and distribute student pages. Each student should have a copy of the student activity book. Ideally, the student activity book should be distributed and discussed the day before the activity.